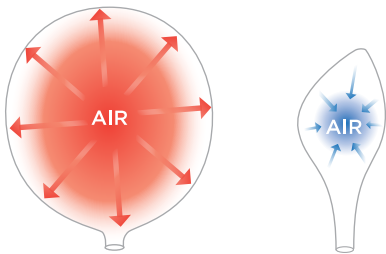


Joint Polar Satellite System

How to Make a Thermometer

It's Fall!

Leaves are changing and so is the temperature outside. Depending where you live, temperatures can drop quickly. Throughout Fall, scientists measure and compare air temperature at different locations in order to forecast the weather. This information is also important for understanding local, regional, and yearly temperature changes.



Air expands (grows) when heated and contracts (shrinks) when cooled.



A traditional thermometer is a glass tube filled with red liquid (alcohol) marked with a temperature scale. When the air temperature changes, the red liquid expands or contracts inside the glass, showing the outside temperature.

A change in temperature can cause the air to become larger or smaller. As the temperature warms up in the summer, the air will expand (grow). As the temperature cools down in the fall, the air will contract (shrink).

Warm and cold air interact with each other, forming clouds, rain, and storms. Scientists want to keep an eye on daily temperatures in order to forecast the weather. Earth-observing satellites like the Joint Polar Satellite System (JPSS) help scientists measure air, land and ocean surface temperatures. Scientists then use these data to understand how temperature influences the weather and let us know if it's too hot or too cold to go outside.



Want to measure temperature?

Make a thermometer!

Temperature

is the amount of heat energy present in a substance or object.

Make a Thermometer

You will need

- Water
- Rubbing alcohol (use under parental supervision)
- Measuring cup
- Food coloring
- Container such as a water bottle
- Clear straw
- Clay or wall putty
- Hot water and ice water



Create your Thermometer

1. **Measure** and **pour** $\frac{1}{4}$ cup of water and $\frac{1}{4}$ cup of rubbing alcohol into your container.
2. **Add** a few drops of food coloring.
3. **Put** your straw into the container and **seal** the top with clay.
HINT: make sure the straw does not touch the bottom of the container when it is sealed. This makes the container **airtight** so the liquid will travel through the straw.
4. **Place** your thermometer in a container with one inch of warm water.

What do you notice?

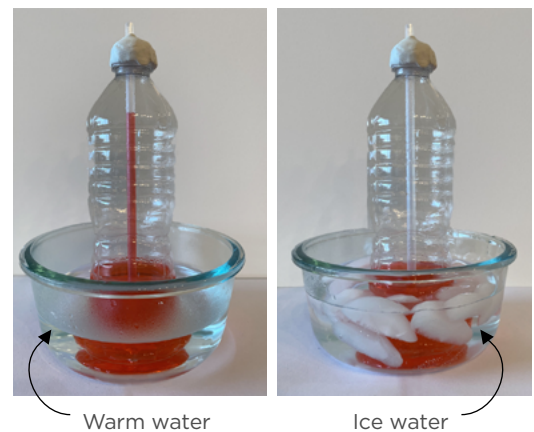
The liquid starts rising up the straw because the warm water causes the air in the bottle to heat up and expand (grow). The container is airtight so the only place the liquid can go is up through the straw. The liquid will fall back down the straw after the thermometer is removed from the warm water and the air cools down.

CAREFUL: If the water is too hot the liquid may come out of the straw.

5. **Place** your thermometer in a container of ice water.

What do you notice?

The opposite will happen. The liquid starts falling back down the straw because the ice water causes the air in the bottle to cool down and contract (shrink). The liquid will return to a normal level after the thermometer is removed from the ice water.



 Learn more about JPSS at <https://www.jpss.noaa.gov/education>



JOINT POLAR SATELLITE SYSTEM (JPSS)

JPSS is a collaborative program between the National Oceanic and Atmospheric Administration (NOAA) and its acquisition agent, National Aeronautics and Space Administration (NASA).

 www.jpss.noaa.gov

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